CLAIMS

1. A unique sensor or assembly of sensors formed as an imager, each sensor delivering a signal corresponding to one pixel of the image, and having,

a detection brick with a detection zone including a photosensitive material,

a brick for addressing and optionally processing signals from the sensor(s), this brick notably bearing an addressing circuit and,

an interconnection brick located between the detection brick and the addressing brick, this brick bearing connection pads connecting sensors of the imager to the addressing circuit, so that the signals from the sensors are individualized,

characterized in that the photosensitive material of the detection brick contains at least a polymorphous silicon layer.

2. The unique sensor or assembly of sensors forming an imager, according to claim 1,

characterized in that the polymorphous silicon layer has a thickness less than 4,000 Angstroms.

3. The unique sensor or assembly of sensors forming an imager, according to any of claims 1 or 2,

characterized in that the interconnection brick is formed by pads (5, 5') embedded in an insulator (1, 2, 3).

4. The unique sensor or assembly of sensors forming an imager, according to any of claims 1 to 3,

characterized in that the interconnection pads (5,

5') are either in aluminium or copper or tungsten or chromium.

5. The unique sensor or assembly of sensors forming an imager, according to any of claims 3 or 4,

characterized in that the insulating material embedding the pads, is formed by a stack of dielectric layers forming Bragg mirrors.

6. The unique sensor or assembly of sensors forming an imager, according to any of claims 1 to 5,

characterized in that electrodes (60, 94) are formed above pads (5, 5'), these electrodes having a lower surface electrically coupled with a pad (5), and an upper surface, the upper surface of the electrode having a larger surface dimension than the lower surface in contact with the pad.

7. The unique sensor or assembly of sensors forming an imager, according to claim 6,

characterized in that the upper surface of the electrodes has a cup shape.

8. The unique sensor or assembly of sensors forming an imager, according to any of claims 6 or 7,

characterized in that a lower portion of each electrode is embedded in an insulator layer, an upper portion of this electrode appearing above said insulator layer.

9. The unique sensor or assembly of sensors forming an imager, according to claim 8,

characterized in that the insulator layer

surrounding a lower portion of the electrodes consists of a stack of layers forming Bragg mirrors.

10. The unique sensor or assembly of sensors forming an imager, according to any of claims 6 to 9,

characterized in that the electrodes (64, 94) are either in aluminium or copper or tungsten or titanium or chromium or titanium nitride or a doped semiconductor or an organic conductor or a conducting oxide, or even finally a composite stack of the materials mentioned above.

11. The unique sensor or assembly of sensors forming an imager, according to any of claims 6 to 10,

characterized in that the polymorphous silicon layer (76) is placed above the layer including the insulator and the electrodes.

12. The unique sensor or assembly of sensors forming an imager, according to claim 11,

characterized in that at least an upper silicon layer (79) has a lower portion containing carbon and an upper portion containing boron.

13. The unique sensor or assembly of sensors forming an imager, according to any of claims 1 or 3 to12,

characterized in that the thickness of the polymorphous silicon layer (76) is between 0.5 and 2 µm.

14. The unique sensor or assembly of sensors forming an imager, according to any of claims 1 to 13,

characterized in that the detection zone including the polymorphous silicon is an intrinsic zone of a PIN or NIP diode.

15. The unique sensor or assembly of sensors forming an imager, according to any of claims 1 to 14,

characterized in that electrodes 64, 94 are formed above pads 5, 5', these electrodes being etched in an n or p material layer.

16. The unique sensor or assembly of sensors forming an imager, according to claim 10,

characterized in that at least one of the electrodes contains an n doped material.

17. The unique sensor or assembly of sensors forming an imager, according to claim 10,

characterized in that at least one of the electrodes contains a p doped material.

18. The unique sensor or assembly of sensors forming an imager, according to claim 9,

characterized in that at least one of the electrodes contains an n doped material.

19. The unique sensor or assembly of sensors forming an imager, according to any of claims 1 to 18,

characterized in that the polymorphous material layer is an intrinsic layer placed above the electrodes.

20. The unique sensor or assembly of sensors forming an imager, according to claim 19, as depending

on claim 17,

characterized in that a p doped layer is placed above the amorphous silicon layer thereby producing a NIP diode.

21. The unique sensor or assembly of sensors forming an imager, according to claim 19, as depending on claim 18,

characterized in that an n doped layer is placed above the intrinsic amorphous silicon layer thereby producing a PIN diode.

22. The unique sensor or assembly of sensors forming an imager, according to claim 6,

characterized in that the pads include an upper metal surface, and in that the polymorphous material layer is directly placed in contact with the pads.

23. The unique sensor or assembly of sensors forming an imager, according to claim 22,

characterized in that an n doped layer is placed above the polymorphous silicon layer.

24. The unique sensor or assembly of sensors forming an imager, according to claim 22,

characterized in that a p doped layer is placed above the polymorphous silicon layer.

25. The unique sensor or assembly of sensors forming an imager, according to claim 24,

characterized in that the electrode is in a transparent conducting oxide.

26. The unique sensor or assembly of sensors forming an imager, according to claim 24,

characterized in that the electrode is made in a layer of a metal partly transparent to ultraviolet radiation.

27. The unique sensor or assembly of sensors forming an imager, according to claim 24,

characterized in that the upper electrode is a metal grid.

28. The unique sensor or assembly of sensors forming an imager, according to claim 24,

characterized in that the electrode is formed by two combs each having teeth, the teeth being interdigitated.

29. The unique sensor or assembly of sensors forming an imager, according to

30. A method for producing an assembly of photodetectors according to any of claims 1 to 29,

characterized in that:

after producing a substrate notably including an addressing circuit and optionally signal processing circuits,

one or several layers of insulating materials are deposited,

said layer is etched so as to form holes in this layer,

some holes are filled with a conducting material thereby forming interconnection pads (5, 5'),

mechano-chemical polishing is carried out

optionally,

one or more insulating material sublayers are deposited,

said insulating material sublayer is etched above pads (5, 5'),

a layer is deposited over the etched insulator layer, thereby forming a non-planar conducting material layer, cups appearing above the pads,

the conducting material layer which has just been deposited is etched in order to form electrodes separated from each other,

an unintentionally doped polymorphous material layer is deposited,

a doped layer is deposited,

a conducting material (24) layer forming an upper electrode is finally deposited.

31. The method according to claim 30,

characterized in that

the temperature for depositing the polymorphous material is between 175°C and 250°C.

32. The method according to any of claims 30 or 31,

characterized in that

deposition of the polymorphous material is followed by deposition of a layer containing carbon at least in its lower portion.

33. The method for producing an assembly of sensors according to any of claims 1 or 29,

characterized in that:

the method comprises a step for depositing a

polymorphous silicon layer, this layer coming into contact with either a metal upper portion of conducting pads, or n doped or p doped electrodes, themselves in contact with a conducting pad, this step for depositing the polymorphous silicon layer being achieved by a PECVD method (Placement Enhanced Chemical Vapor Deposition), and at a temperature between 150 and 250°C.